

COMMENTS OF THE DEPARTMENT OF WATER RESOURCES
ON
STATE WATER RESOURCES CONTROL BOARD
DRAFT DECISION 1630

February 16, 1993

I

General Comments

The Draft D-1630 proposes, as did its predecessor D-1485, to regulate the SWP and CVP for water quality protection for the Bay-Delta estuary and for the protection of instream beneficial uses of water.^{1/} The predominant features of the draft order are increased direct limitations on spring export, control of net flow reversal (QWEST) in the lower San Joaquin River year round, the requirement of flow pulses for salmon and striped bass, implementation of the entire unmodified water quality plan objectives as standards against the SWP and CVP, and a new \$300 million mitigation fee program to fund fish and wildlife measures.

Impacts of the Draft Decision

The Department has prepared and submitted under separate cover as mentioned above a water supply impacts document, which includes operation studies, comparing project operations under D-1485 with those under D-1630. These studies ~~show~~ compared project impacts of almost 1 million acre-feet per year during the critical period and an average of almost 900,000 acre-feet per year over the entire 71 year period of record. In dry years the average reduction in delivery capability would be 1.4 million acre-feet with a maximum single year reduction of over 2 million acre-feet.

^{1/} Without substantial modification, pulse flow provisions ostensibly applicable to other storage projects will likely end up being at the expense of the SWP and CVP.

These impacts are fairly close to those reported in the Draft D-1630. However, the decision goes on to compare a DWRSIM D-1630-3 run for the 1984-1989 period with the actual average historical deliveries for that period. It finds an apparent impact of only 100,000 acre-feet per year. DWR has consistently pointed out that DWRSIM is most appropriately used to compare model runs under different criteria. It is not appropriate to compare a DWRSIM run with actual historical operations. A model run uses monthly flows and fixed assumptions (e.g., demand, Trinity operations, in-basin depletions, etc.) which in actuality varied over that period for which the operation study is run. In particular, demand has increased dramatically since 1984 in response to a population increase of over 5 million people.

In fact, DWR has "reoperated" the projects using daily flows for two recent years, 1991 and 1992, as though D-1630 instead of D-1485, had been in effect. This reoperation, not a model run, is also shown in the water supply impact assessment. Had D-1630 been in effect during each of those two years, decreases in exports and storage would not have been in the neighborhood of 100,000 acre-feet per year, but 1 million acre-feet per year.

Coordinated Operation Agreement

The Board's draft decision indicates that approximately 70 percent of the impacts of the decision fall on the CVP and 30 percent on the SWP. The manner in which the two projects are to share responsibility for in-basin requirements in general and for Delta standards in particular is governed by the coordinated

operation agreement, which was specifically authorized and directed by Congress in PL 99-546. The Board has not shown how it has used the COA to arrive at the 70-30 split between the two projects. While the assessment of how the impacts will be shared is essential to the Board's balancing process, the Board is not in a position to direct what that sharing is to be. Deference to State water rights law under federal reclamation law is required where not contrary to clear congressional directives, such as the directive in PL 99-546 to follow the COA. The pumping limitations, both direct and as a product of QWEST controls, raise serious concerns about consistency with the Coordinated Operation Agreement.

Future Facilities/Transfers

With the substantial restrictions on exports entailed in the pumping limitations and reverse flow criteria, the construction and operation of water banking facilities south of the Delta likely are economically infeasible. The increased numbers of times that San Luis will not fill under D-1630 is a measure of the decreased utility of greater storage south of the Delta. The specifics of these impacts on projects such as the Kern Water Bank and Los Banos Grandes Reservoir are set forth in the Detailed Comments, which also discusses the need for further modeling to move beyond our preliminary estimates.

The impacts of D-1630 on water transfers is similarly discussed in the Detailed Comments. In general, north-south transfers will depend on export capacity and carriage water costs.

DWR's "Impact Assessment" shows that Qwest would limit Delta exports to the extent that the projects will seek ways to reoperate to try to recoup losses under D-1630, especially in the period September-January, and thus transfer potential will diminish.

Environmental Impacts

The Department continues to question the applicability of the categorical exemptions the Board has proposed to comply with the California Environmental Quality Act. We believe that the probability that impacts associated with pulse flows, closure of the cross channel, or reductions in surface water to agricultural areas with resultant increase in ground water pumping, for example, could be significant. This raises to our mind questions regarding the justification for the use of categorical exemptions.

Agreements

One of the important areas where the Board's proposed decision troubles the Department is in how the decision has related to the agreements, processes, and activities of other agencies trying to address Delta issues. In its notice of hearings on interim actions and often previously the Board encouraged and invited parties to try to resolve problems through agreements and then to present them to the Board. Regulation is but one way government may address issues. Complex issues and issues of general policy benefit greatly from consensus approaches involving negotiation and agreement among affected interests. The

BDOC process is an example. While the Board may have the authority to take action in certain areas notwithstanding the agreement processes of others, it should in principle seek to harmonize its actions with those other processes even to the point of adopting their conclusions and solutions wholesale. Where the Board has encouraged and fostered agreements, it should be careful not to second guess or undermine these important processes. The following are some of the areas in which it is difficult to find harmony between the Board's decision and specific agreements or processes of governmental agencies:

The three party South Delta agreement among the Department of Water Resources, the Bureau of Reclamation, and the South Delta Water agency; the Suisun Marsh agreements (the Suisun Marsh Preservation Agreement, the Monitoring Agreement, and the Mitigation Agreement) among the Department of Water Resources, the Bureau of Reclamation, the Department of Fish and Game, and the Suisun Resource Conservation District and embraced in PL 99-546; the Coordinated Operation Agreement between the Department of Water Resources and the Bureau of Reclamation, also embraced in PL 99-546; the urban Best Management Practices Memorandum of Understanding; the "Four Pumps Agreement" between the Department of Water Resources and the Department of Fish and Game; the Endangered Species Act Section 7 consultation between the Department of Water Resources, the Bureau of Reclamation, and the National Marine Fisheries Service for winter run chinook salmon (the Board's setting of a QWEST standard for the winter has effectively preempted the inquiry over the impact of reverse flow

versus cross Delta flow on outmigrating winter run salmon); and various statutes conferring authority on the Department of Water Resources to control State Water Project operations and the internal governance of the Department with respect to such issues as carryover storage, the holding of hearings and State Water Project contracting.

Water Quality Standards

It is important to distinguish the water quality standards in the draft Decision from the standards having no relation to water quality concerns. The former are concerned with the constituent qualities of the water (e.g., salinity, BOD, toxics, temperature) and are addressed in water quality control plans under the Clean Water Act and in the Porter-Cologne Water Quality Control Act. The Board uses its water rights authorities not only to help implement water quality objectives, but also to protect beneficial uses from non-water quality influences such as diversions, flow regimen, river stage, flow depletions, and other characteristics of water courses.

The draft decision requires, as D-1485 did before it, that the State Water Project and the Central Valley Project alone protect water quality in the Delta. It neither discusses any attempt to allocate the burden among other users in the system nor to seek implementation from other agencies as directed by the Racanelli decision.

At the end of the water quality phase, the Department expressed its reservations to the Board regarding the propriety

and reasonableness of the objectives contained in the final draft water quality control plan on account of the lack of sufficient development of the Program of Implementation which is required by Porter-Cologne. From colloquies with the Board members at that time, the Department expected that this fuller development would occur in the scoping phase of the hearings. The Department is disturbed to find that, instead of a program of implementation that looks to the costs and benefits of implementing the plan's objectives against various parties, the water quality control plan objectives were merely translated wholesale to standards applicable against the State Water Project and the Central Valley Project alone. As a consequence one finds anomalies in that portion of the decision: the requirement that the State Water Project assure water quality at Vernalis; the requirement that the State and Federal projects assure appropriate levels of dissolved oxygen at Stockton; and the implementation of the temperature objective against the projects alone where the plan itself acknowledged that the operation of projects for temperature control was presumptively unreasonable. The fact that the Board has gone in after the fact in its errata sheet and addressed the Vernalis and the D.O. problems does not remove the impression that wholesale implementation against the projects was unconsidered.

Apart from basic issues of process and fairness, two other points arise from the Board's treatment of water quality standards in the decision. First is that changes to flow standards or to project operations made in D-1630 should change the assessment of reasonableness of the water quality objectives established in the

water quality control plan. The ability to meet water quality objectives in the interior Delta (for M&I and agricultural uses) will be greatly altered if the Delta Cross Channel is to remain closed for substantial periods of time. There is no discussion or consideration of this impact on the objectives themselves or on the manner of their implementation. Again, it seems to indicate that the Board's treatment of water quality standards was simply unconsidered.

The second area of concern, perhaps the most important, is that the decision, entailing no discussion or findings with respect to the implementation of the water quality control plan, takes no account of the specific points that the Department has repeatedly made with respect to the individual objectives involved. It is, frankly, baffling that the Board can continue to ignore the effects of water quality degradation from local runoff in the vicinity of Rock Slough; or that it can purport to require standards to be met in the South Delta which are impossible to always achieve.

Adequacy of Biological Premises

Our detailed comments contain a lengthy discussion of what the Department views to be a problem with the adequacy of the biological premises for the Board's decision. We think that the Decision focuses too heavily on the SWP and CVP and not on the many other factors that affect or determine the biology of the estuary. We find the assertions of the magnitude of project impacts on instream uses largely unsupported. We also believe

that the measures proposed will be of uncertain benefit, given the influence of these many other factors. In December of 1988, following the issuance of the Board's first draft water quality control plan (November 3, 1988), the Department urged the Board to analyze and deal directly with the issue of the fundamental uncertainty which attends the great proportion of the biological information which has been submitted to the Board. We think, therefore, that the Board's final decision should be candidly viewed as experimental and that it should continue to evaluate the interaction of biology, hydrology, and project operations in an ongoing program of standard development.

Interim South Delta Facilities

As the Board noted on page 7 of the Draft Decision, DWR is working on other facilities to help restore the environment and improve water supply through its South Delta Water Management planning efforts. The Board's interim actions will probably make these improvements all the more vital. The Board should make clear its view that the Department's work should be expeditiously accomplished and that it is necessarily linked to successful interim measures for the Delta.

II

Recommendations

DWR believes that the following changes should be made to the Order in the draft decision. It is our view that the flow standards in particular are in large measure experimental because of the complex and uncertain interactions of biology, hydrology, and project operations.

Term 1 [Table II standards]

1. Reverse Flow Standard (QWEST) (p. II-5)

Comment: There is inadequate technical support for the reverse flow standards contained in D-1630. The technical basis apparently came in part from USFWS information relating temperature-corrected survival of hatchery Chinook salmon released at Ryde versus QWEST for an unspecified period. Some of the data from the period of record were not used in this relationship, 1983 and perhaps 1986. USFWS reported a statistically significant relationship at the 10 percent level of significance with an "r" value of 0.49, and a r^2 value of less than .25. There is no significant correlation when all the data are used. The data indicating a correlation between QWEST and striped bass salvage at the export facilities for July and August raise the question whether this represents cause and effect or simply

autocorrelation with reverse flows farther upstream. (See detailed comment.)

Recommendation:

- *Eliminate the QWEST standard for the period August-January.*
- *Develop real-time monitoring criteria for February-July for times when a QWEST standard may be invoked, and include provisions such as a Mallard Slough relaxation trigger (e.g., 12,000 cfs)*

2. Pulse Flows [pp. II-3, 4, 5]

Comment: See Terms 2, 3, 4, 5, 8(g) comment, infra

3. Export Limits [pp. II-6, 7]

Comment: The draft decision overstates the degree to which fish populations correlate to the diversions of water from and upstream of the Delta. The new April pumping limitation imposes, by far, the largest single month water supply impact (at times in excess of 400,000 acre-feet)

Recommendation:

- *Eliminate the April restriction, or at a minimum, remove it for the first half of April with dry and critical year relaxations for the second half.*
- *Move the control point from the Banks pumping plant to the entrance of Clifton Court Forebay.*

4. Delta Cross Channel Operation (P. II-7)

Comment: If the cross-channel is ordered closed without adequate notice during an upstream reservoir release

operation, and QWEST becomes limiting, over 70 percent of the intended transfer from storage may be lost.

Recommendation:

- *Suspend operation of the QWEST standard until reservoir releases are captured if adequate notice of cross-channel gate closure has not been provided.*
- *Suspend or modify the applicability of interior Delta water quality standards to account for the impacts of closure. (Contra Costa Canal, San Joaquin River at Prisoner's Point, South Fork Mokelumne River at Terminous, San Joaquin River at San Andreas)*

5. Water Quality Standards

a. Dissolved Oxygen (p. II-3)

Comment: The standard in "Errata" is unworkably vague. A standard applicable against the SWP and CVP alone ignores the uncontradicted testimony that the D.O. block is caused by the discharges of others and is largely beyond the control of the two projects. (see detailed comments)

Recommendation:

- *Eliminate the requirement. The Board should recognize the salutary effects of efforts voluntarily undertaken by DWR in the past to help solve the D.O. problem, as described in other Bay-Delta and Interim Action testimony. The Board should also recognize the role of the barrier in Old River under the South Delta Water Management Program and P. L. 102-575.*

b. South Delta Agricultural Standards (Downstream of Vernalis) (p. II-2).

Comment: On repeated occasions, DWR has offered the 3-party agreement to the Board as the solution to water quality concerns in the South Delta, in conjunction with the uncontradicted testimony that specific water quality levels at most stations cannot be guaranteed by project operations alone, because they are adversely influenced by channel configuration and agricultural depletions and discharges.

Recommendation:

-Recognize the 3-party agreement between the South Delta Water Agency, DWR and USBR and the South Delta water management plan.

c. M&I Standard for the Contra Costa Canal (P. II-1)

Comment: The location of the standard should be moved to Old River where it is not subject to land-derived salts from lands adjacent to Rock Slough and the CCC intake channel. This point has been made repeatedly by DWR. The adverse influence of agricultural runoff was also pointed out by CCWD in the Los Vaqueros hearing.

The 150 mg/L standard should not be applied against the projects. It was developed specifically as a project requirement to protect paper mills in the Antioch area. This requirement has been discharged through the execution of agreements with the mills compensating for quality worse than 150 mg/L chlorides.

Recommendation:

- Move the M&I standard to Old River near Rancho Del Rio
- Eliminate the 150 mg/L standard as against the projects.

d. M&I Standard at Barker Slough and Cache Slough

(p. II-1)

Comment: Similar to the CCC, the location of the standard for the North Bay Aqueduct should be moved away from the influence of runoff from lands adjacent to the intake.

Recommendation:

- Move compliance location to Cache Slough near Junction Point.

e. San Joaquin River at Prisoner's Point (p. II-4,5)

Comment: See "Comment" to 4, above.

Recommendation:

See "recommendation" to 4 above.

f. Suisun Marsh Standards (p. II-6)

Comment: Pursuant to the recommendation and petition of DWR, USBR, DFG, and SRCD, as well as the Act of Congress embracing the same, the Board should adopt the standards in the Suisun Marsh Preservation Agreement and recognize the accompanying Mitigation and Monitoring Agreements.

Recommendation:

- Adopt the standards in the Suisun Marsh Preservation Agreement
- Recognize the SMPA, and the Mitigation and Monitoring Agreements

g. Temperature Standards (p. II-3)

Comment: As footnote 4 correctly recognizes, temperatures in the Delta cannot be reasonably controlled by reservoir releases.

Recommendation:

Eliminate the standard.

h. Agricultural Standard at Emmaton (p. II-1)

Comment: None

Recommendation:

- *Establish Three-Mile as an alternative control point to Emmaton, to take effect when DWR has satisfied the pertinent conditions of the 1981 North Delta Water Agency contract.*

i. Mallard Slough Relaxation Criterion (3.0 E.C.)

Comment: This is described and intended as a flow criterion, equal to approximately 12,000 cfs.

Recommendation: *To the extent the criterion is used, eliminate the water quality parameter surrogate and substitute 12,000 cfs.*

Terms 2, 3, 4, 5, 8(a) [Pulse Flow] (pp. 108-111)

Comment: In general, these terms need to specifically order releases by all parties in real time, to be determined and enforced by the Board, to assure that real water is provided. The current provisions for monitoring of flow and payback of water appear to be unworkable and unenforceable, and there is no apparent reason why the Board should not take direct action and police it. There are other specific points to

ensure fairness and to avoid conflicts with water project laws.

Recommendation:

- Specify a 14-day running average for all pulse flow standards
- Mandate all reservoir releases in real time.
- Develop and implement an accounting for refill impacts to assure that impacts are not simply shifted to downstream operators, or to SWP and CVP
- Delete the ability to repay or to provide for pulse flows in dollars rather than water (contracting for the sale or delivery of SWP water is governed by the Burns-Porter Act).
- Delete the ability of diverters to pay a fee instead of ceasing diversion.
- Any "fee" should go in any case to the CVP and SWP who must make up the pulse water, with no reference to Water Bank rates.
- Provide for dry period relaxation of the pulse flow requirement.
- Remove credit for existing upstream public trust releases. (If this is normal operation mode, these releases are not new water to the system and simply shift the burden to the downstream operator.)
- Relax 1500 cfs pumping limit on CVP and SWP during the SJR pulse based on real-time monitoring
- See detailed comments

Term 6 [Urban BMP's] (p. 112)

Comment: The Board has repeatedly stated a policy to encourage and defer to voluntary agreements on Bay-Delta issues.

Recommendation:

- Delete Term 6 and recognize the Urban BMP's MOU.

Term 7: [Agricultural water use] (p. 115)

Comment: Board should defer to the AB 3616 process

Recommendation:

- Delete the requirement for maximum deep percolation (0.4 acre-feet/acre) (as inconsistent with the findings of the San Joaquin Valley Drainage Program).
- Recognize AB 3616 process

Term 8: [Water Project Operations] (p. 115)

Comment: The subject matter of these terms is statutorily within the province of DWR. DWR may find it appropriate to cooperate with the Board in these areas.

Recommendation:

- Delete Term 8 and recommend intergovernmental cooperation

Term 9: [Mitigation Fund] (p. 115-117)

Comment: The Board's proposal to levy fees and set up its own mitigation and enhancement program is novel. We are unaware of any precedent. The Board may not have statutory authority to assess these fees, to appropriate the proceeds to itself, or to conduct the spending program proposed.

Recommendation:

- Clarify authority for fee program
- Recommend that levy be expanded to include all diverters and others having impacts on Bay-Delta beneficial uses.
- Recognize and credit mitigation works accomplished and currently in effect by proposed fee-payers, such as DWR, (Feather River hatchery, 4 pumps program, Skinner Fish Facility, etc).
- Include funding for expanded monitoring program

Term 10 [Monitoring] (p. 117-119)

Comment: With recognition of the expanded responsibilities for Bay-Delta public interest impacts beyond those of the SWP and CVP, the Board's authority to establish and fund a general program of monitoring with all parties contributing should be clarified.

Recommendation:

- Include support of DWR/USBR monitoring program for the purposes needed in the recommended mitigation fund.
- See Detailed Comments.

Term 11. [Additional information]

Comment: All requirements for additional information should be reasonable and related to the particular water right holder.

Recommendation:

- Modify the first sentence to read:
"is reasonably required from and related to the activities of water rights holders"

Term 12. [Variances]

Comment: All standards should be the subject of a variance

Recommendation:

- Delete the word "fishery" in the first sentence of Term 12.

Term 13 [Real-Time Monitoring]

Comment: This monitoring should be supported by Term 10 program.

Term 14 [Fish Facilities Operation]

Term 15 [Continuing Authority/Reservation of Jurisdiction]

Term 16

a. [Use of SWP Facilities]

Comment: SWP and CVP diversion points should be made interchangeable to promote operational flexibility. It is also misleading to suggest that CVP deficiencies can be "made up" under the proposed D-1630 as they had been under D-1485.

Recommendation:

- Delete D-1485 condition 3 and allow CVP and SWP facilities to be used interchangeably as joint points of diversion for all purposes.

b. [Monitoring]

Comment: This section improperly relates monitoring to water quality impacts of the SWP and CVP only. This would seem to be a violation of Racanelli decision principles.

Recommendation:

- Change Condition 4 to comport with Racanelli decision

c. [studies]

Comment: Same as for b.

III
Detailed Comments

Fish and Wildlife

- There is a strong implication throughout the Decision that Delta water project operations are (1) the primary cause of the decline of all the species cited and (2) that if operations are modified, the declines will reverse. The Bay-Delta ecosystem is not this simple. DWR hearing testimony referred to in our specific comments under this heading suggest other factors could account for as much or more of the ecological problems than project operations. We encourage the Board to more clearly acknowledge these uncertainties and characterize any new requirements as experimental.

- The Decision states that the Board's short-term goal is to "stop the decline". Several different and inconsistent definitions were used by various parties during the hearings to identify declines and these declines are cited as the basis for the Decision (e.g. page 29, paragraph 3). However, the Decision does not adequately define the term "decline". Some species are in decline; some are not. What standard is the Board using?

- The bases for a number of the findings and proposed measures are not clearly stated. We discuss these further in the specific comments following.

- The Decision would require DWR to pay into a mitigation fund for water diversion. DWR is already providing substantial mitigation through the Delta Pumping Plant Fish Protection Agreement and other processes. Such payments should be credited to DWR's mitigation fund responsibilities to avoid having DWR double mitigating for impacts.
- A number of specific issues regarding the requirements, monitoring, and use of funds need to be addressed. One way to address these issues is through the use of interagency workgroups. One or more groups could identify the questions associated with these issues and recommend actions to the Board. The Interagency Ecological Studies Program's Fishery and Water Quality Committee, for example, might help in developing the real-time monitoring program for fish in the Sacramento River.

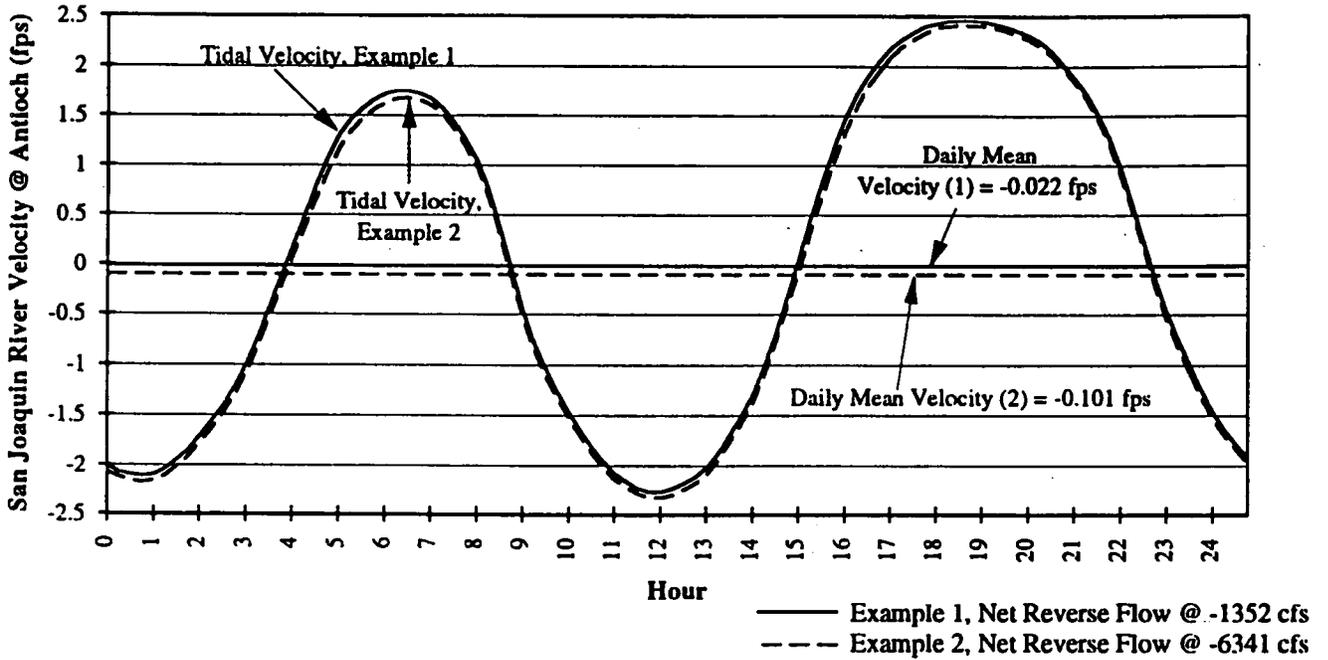
Specific Comments

Page 27, Paragraph 3 and Page 31, Paragraph 2: Language suggests that when the SWP and CVP Delta pumps are operating, the flow in some western and southern Delta channels is always reversed, causing water from the Central Delta to be drawn toward the pumps. This is misleading. The statement should be qualified to indicate the relative magnitude of tidal flows compared with net flows, as illustrated in Figure 1. Tidal flows on the order of 150,000 cfs in the lower San Joaquin River reverse twice daily.

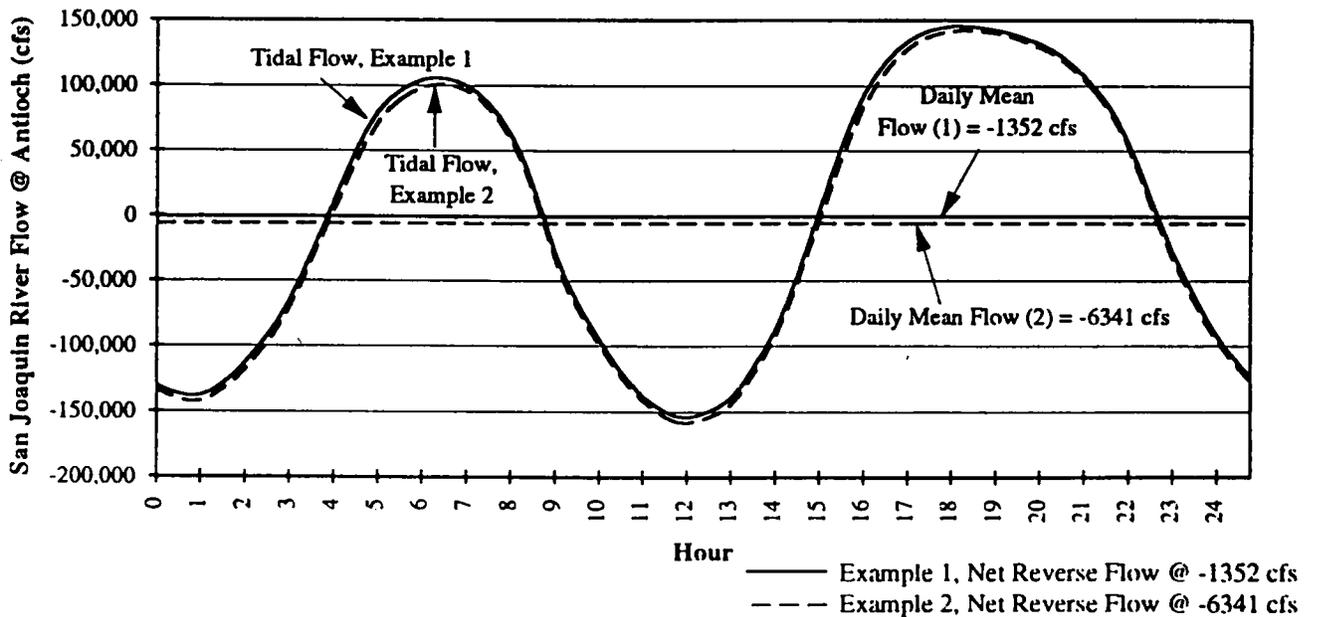
Figure 1

Comparison Of Daily Mean Flow And Velocity With Tidal Flow And Velocity At Antioch (Approximate Location Of QWEST)

Velocity Comparison



Flow Comparison



Note: Data are DWRDSM Model Results from Georgiana Slough Barrier Study

The relative magnitude of net reverse flow (up to approximately 6,000 cfs) is small in comparison. More importantly perhaps, a 5,000 cfs change in reverse flow only translates into a 0.08 foot-per-second velocity change, which is not significant to species with swimming ability.

Page 29, Paragraph 3: Here and elsewhere, the report states that the Estuary fishery resources are "in a state of decline". We have the following concerns and suggestions about the statement and the supporting evidence:

1. The statement could easily lead a reader of the draft Decision to incorrectly conclude that all Estuary fishery resources are declining. While the abundance of some species have declined, others have increased or not changed (WRINT-DWR-30, pp. 23 and 26-28). We suggest the statement be modified to more clearly indicate this fact.
2. The manner in which the population data are used as evidence of declines of specific species is inconsistent and misleading. For example, the San Joaquin salmon population in 1985 is compared to that in 1991; the Delta smelt population index in 1985 is compared to the average population 1967-1982; and the striped bass population indices in the early and late 1960s are compared to that in 1990.

The comparison of the San Joaquin salmon does indicate a significant decline over a relatively short number of recent years. However, it should also be noted that this population has historically fluctuated widely. For example, the 1991 population was similar to those in 1962-1963, prior to SWP Delta diversions.

The comparisons of the Delta smelt and striped bass population indices do not support the broad conclusion regarding the Estuary's "state of decline". The adult Delta smelt index in 1985 was the lowest recorded, less than the average of any period of record. It was also about 60 percent of the 1986-1991 average (WRINT-DFG-9, p. 29). In addition, the 1991 index was one of the highest recorded and about the same as the 1967-1982 average. If the 1985 population index is compared to the 1991 index (as was done for San Joaquin salmon), one would conclude that Delta smelt abundance increased rather than declined.

While comparing striped bass abundances in the 1960s to 1990 suggests a decline, it does not show that this decline is still occurring. The non-hatchery adult bass population hovered at about 1 million for most of the last 15 years. However, unlike the smelt abundance indices, bass abundance did decline for four consecutive years from 1986-1990 (WRINT-DWR-206, Table 2). Nevertheless, the 960,000 adults estimated in 1991 suggests the population may have actually rebounded to former levels.

3. The report indicates that the abundance of shrimp and rotifers has declined since the 1970s and 1980s. It is our understanding that while this may be true for some species, the abundance of others has increased or not changed. If so, we encourage the Board to better qualify such statements to avoid misleading readers.

Page 30, Paragraph 2: There is not adequate technical support for the reverse flow standards contained in D-1630. Much of the technical basis apparently came from USFWS information relating temperature corrected survival of hatchery Chinook salmon released at Ryde versus QWEST for an unspecified period. Some of the data from the period of record were not used in this relationship, at least 1983 and perhaps 1986. USFWS reported a statistically significant relationship at the 10 percent level of significance with an "r" value of 0.49. Furthermore, as discussed in the comments for page 27, there is little physical significance in terms of velocity changes induced by net reverse flow. A 5,000 cfs change in net reverse flow only translates into a 0.08 fps velocity change, which is not significant for fish with swimming ability.

There are several points about this relationship that make it questionable for use in setting standards which have such far reaching consequences on the Bay-Delta and California. The major concerns are:

- If the entire data set is included, there is no statistically significant relationship.
- If 1992 data are not used, there is no statistically significant relationship. Survival in 1992 was the highest seen thus far in the studies with the survival indices exceeding 2. Until 1992 the highest we had seen was 1.8. In theory the highest survival index should be 1.
- Even if the relationship is valid and there is cause and effect as implied by the statistical significance, the relation only explains 25 percent of the variation in survival. This does not appear to be sufficient basis for what, in effect, are the controlling Bay-Delta standards during most of the year.
- The range of QWEST values included in the regression is extremely limited, from about -2,500 cfs to plus 1,000 cfs.
- For winter Chinook salmon the temperature correction (for 62 degrees F) does not accurately reflect temperatures encountered by these fish during their outmigration.

The Decision overstates the degree to which fish populations relate to the diversions of water from and upstream of the Delta. Many such correlations are weak and warrant further investigation.

DFG found no evidence of such a relationship for Delta smelt (WRINT- DWR-30, p. 12).

The Decision also states that export pumping and reverse flows are major causes of the declines in fish populations. DWR's testimony is inappropriately cited to support this statement. Actually, DWR testimony pointed out only that fish were lost at the export pumping plants and that the number of striped bass lost in June and July was positively correlated to an index of reverse flow in the lower San Joaquin River (WRINT-DWR-30, p. 7). We also pointed out a number of other factors that affect the population abundances of fish in the Estuary, and the difficulty in determining the relative importance of these factors on the abundance of fish populations (WRINT-DWR-30, p. 43). Most importantly, we presented evidence that (1) reverse flow was not correlated to Delta smelt abundance (WRINT-DWR-30, p. 13) and (2) that Delta survival has not correlated to the abundance of Sacramento fall Chinook salmon (WRINT-DWR-201, pp. 16 and 19).

The Decision should also clearly acknowledge actions that have been taken to avoid, reduce or mitigate water project operations on Delta resources. For example, the report repeatedly mentions the losses of salmon and striped bass at the SWP Banks Pumping Plant. It should also mention that DWR is taking actions to fully offset those losses through habitat restoration projects and increased hatchery production.

Page 34, Paragraph 3: The text indicates that Vernalis inflow, export rate and upper Old River diversions have the greatest influence on San Joaquin River smolt survival in the Delta. However, water temperatures, dissolved oxygen and toxins are likely to also be significant problems and should be listed.

Page 36, Paragraphs 3 and 4 and Page 37, Paragraph 1: The Decision recommends pulse flows of 2,000 to 10,000 cfs in the San Joaquin River, and notes that fishery agencies recommend the installation of a barrier at the head of Old River to improve salmon smolt survival. These mandated pulses (above 5,000 cfs) might cause flooding problems when the current temporary barrier is in place. The Board needs to (1) assess the potential flooding problems of pulse flow standard with the barrier and/or (2) show that the pulse flow would be better for fish than the barrier.

Page 37, Paragraph 2: The text mentions that adult salmon have strayed into Mud and Salt Sloughs. It should also mention that DWR funded the construction and operation of an electrical barrier across the San Joaquin River upstream of the Merced River to eliminate such straying, and thereby help offset salmon losses at the State Water Project's Delta Pumping Plant.

Page 38, Paragraph 1: WRINT-DFG-25, p. 10 is cited to support a recommended attraction flow standard of 2,000 cfs for the San Joaquin River. We were not able to find any information related

to that recommendation in that exhibit. The correct source of this assertion needs to be stated.

Page 39, Paragraph 2: The text states that the striped bass model suggests that protection of striped bass young-of-the-year (YOY) in the spring alone is not sufficient to protect the species. This statement should be also viewed in light of the alternative catch-per-effort model provided in DFG's exhibit (WRINT-DFG-3) which showed that the abundance of adult striped bass depends primarily on the YOY index, a function of spring exports and outflow (WRINT-DWR-201, p. 15).

The Decision should also characterize the model's inherent statistical defects due to autocorrelation, multicollinearity and the propagation of errors through the model's various components (WRINT-DWR-206, p. 7). Because of these statistical flaws, the model is not useful for predictive purposes.

The text incorrectly states that there were no quantitative data available to measure the effects of poaching and pesticides. DFG has estimated poaching losses (WRINT-DWR-30, p. 34). Howard Bailey of U.C. Davis (working under contract to the Board) found the past level of rice pesticide use in the Sacramento Valley to be a better predictor of young striped bass production than the factors used in DFG's model (WRINT-DWR-202). We understand that recent data indicates that pesticide levels have been dramatically

reduced and we would expect that bass populations will respond accordingly. These findings should be stated.

Page 40, Paragraph 2: DFG testimony is cited here to support the assertion that "...low flows in the Sacramento River during striped bass spawning periods increase the mortality of eggs and young..." bass. Actually, the testimony only pointed out that there was a correlation between low flow and high egg and larval mortality. It also listed four "possible mechanisms which would explain this relationship". However, the testimony stopped short of the assertion of cause and effect made here.

Page 41, Paragraph 1: The text discusses the correlations DFG found between average Delta outflow in the winter and spring and the populations of a bay shrimp, longfin smelt and one-year-old starry flounder. It should also mention that the significant correlations for the shrimp and flounder were determined by wet years, and no such relationship was evident when wet years were omitted (WRINT-DWR-201, p. 4).

The text also indicates DFG's assertion that increased freshwater consumption could result in a higher frequency of low-flow years. This is misleading. The Decision should indicate that the projects have had, and are expected to continue to have, a relatively small effect on outflow during wet years (WRINT-DWR-201, p. 4).

Page 42, Paragraph 1: It is stated here that reverse flows should not occur in the San Joaquin or Sacramento rivers during the Delta smelt spawning period in order to transport the larvae to appropriate habitat and to keep them there. However, DFG could not find quantitatively that reverse flow affects adult population abundance (WRINT-DWR-30, pp. 12-13).

Page 42, Paragraph 4: - The text states that a reverse flow limited to 1,000 cfs in July and 2,000 cfs from August through January will provide increased protection against entrainment of Estuary fish. While DWR has found a correlation between reverse flow and the number of bass entrained in June and July (WRINT-DWR-30, p. 7), we are not aware of any data which would support this assertion for August through January for bass, or at any time for other species. There is no basis in the hearing record for this reverse flow measure.

Page 45, Paragraph 3: The text states that the effects of a barrier at the head of Old River in the spring and fall should be investigated. Much of this investigation has already been proceeding. DWR, DFG and USFWS evaluated the barrier installed last year during this period and will have a final report of our findings in February 1993. We intend to continue the evaluation three more years (WRINT-DWR-30, p. 40).

Page 47, Paragraph 1 (Errata): It is stated that reverse flow restrictions "are relaxed" when combined SWP and CVP exports are

less than 2,000 cfs or when Delta outflow exceeds 50,000 cfs. There is no basis in the record for the 50,000 cfs "trigger". DFG testified that 50,000 cfs was an "arbitrary cap". To be consistent with the findings on page 42, paragraph 3, a Delta outflow "trigger" of 12,000 cfs (roughly equivalent to Mallard EC at 3.0 mmhos/cm) would be more appropriate as a basis for relaxation.

Page 48, Paragraph 3: A pulse flow of 18,000 cfs is proposed in the Sacramento River to assist the migration of salmon smolts. The basis for 18,000 cfs is unclear, and it is significantly higher than flows recommended in the hearing testimony.

Page 57, Paragraph 3: The Decision should recognize that DWR is already required by the Delta Pumping Plant Fish Protection Agreement and other agreements to mitigate for a substantial portion of its impacts. DWR is spending millions of dollars each year to (1) avoid fishery impacts and (2) mitigate unavoidable impacts by improving fish habitat in and upstream of the Delta, funding hatcheries operations on the Feather, Mokelumne and Merced rivers, funding additional game wardens to reduce poaching (WRINT-DWR-30, pp. 38-42). The costs of all these activities are already being paid by the SWP contractors.

Page 58, Paragraph 3: The first sentence correctly states that several parties proposed fishery mitigation measures during the hearings. However, these measures were proposed as alternatives

to additional limits on exports, to avoid or minimize adverse effects on agricultural, municipal and industrial water supplies. The proposed Decision not only reduces those supplies, but makes users pay more for them. The text should reflect these facts.

Page 60, Paragraph 2 and Page 111, Provision 5a: Provision 5a in the draft order (page 111) indicates that repayment for pulse flows made to downstream reservoir operators could be made in the form of money rather than water at the current water bank rate. Contracting and payment for SWP water is governed by the State Water Resources Development Bond Act and not within the purview of Board action.

Page 76, Paragraph 1: In assessing the effect of the Decision, the text concludes that it is not possible to quantify the biological response to required measures in advance of their implementation. We agree and would characterize many of these measures as experimental. It will also be difficult to quantify this response even after the measures are implemented, especially after the drought cycle ends. The experimental nature of the Board's proposals needs to be more clearly stated throughout the document.

Page 77, Paragraph 3: The text understates the degree to which the abundance of adult salmon depends on a number of other factors including upstream habitat, upstream conditions and ocean fishing. The Decision should clearly state that the evidence (WRINT-DWR-

201, pp. 16-17) shows that adult populations are not significantly correlated with smolt survival through the Delta. Reinforcing this is the success of the Feather River fall-run salmon fishery-- which produces more returning adults since the construction of Oroville Dam and Banks Pumping Plant.

Page 80, Figure A: The text and this figure indicate that DFG's striped bass model was used to predict average wild adult populations with D-1485 and with the draft D-1630. However, it is not clear how the model was used to develop these numbers. This should be made clear. We continue to recommend, however, that the model not be used.

Page 82-83: DFG's models are used to estimate the effect of the draft D-1630 standards on the abundance of a bay shrimp and starry flounder. The text should note that these two models are based on correlations between outflow and abundance in wet years when projects have little effect on outflow. Such a correlation does not exist in the drier years when project operations could have a significant effect on outflow (WRINT-DWR-201, pp. 4-5).

Page 93: The document reaches a conclusion that the draft decision would not cause a significant adverse environmental impact on the environment in either the estuary, export areas, or upstream areas. This may not be correct with respect to waterfowl management areas, and in particular State and federal refuges. Water deliveries to such areas are tied in some form to overall

deliveries from the projects. If delivery priorities among competing water users remain unchanged, reduced water deliveries from the projects in dry years would result in reduced deliveries to refuges. This is likely a significant environmental impact, both in areas upstream of the Delta (Sacramento Valley wildlife refuges) and export areas.

Page 96, Paragraph 2: We question the suggestion made here that the Decision's reduction in exports will not have a significant adverse effect on the environment in export areas. Ground water overdraft and land subsidence would be aggravated in nonadjudicated basins; shorebirds use of pre-irrigated cropland would be reduced; and irrigation and municipal discharges to streams would be reduced.

Page 96, Paragraph 5 and Page 97, Paragraph 2: The Board assumes here (1) water agencies are going to be making the decisions which will be determining whether D-1630 will have any environmental impacts, (2) when they do, these agencies would be required to consider the impacts of those decisions, and (3) the Board, therefore, does not have to discuss the impacts of its decision in the export areas. Under CEQA, the Board still has to discuss the secondary impacts of its decision involving the decisions of other agencies. There are also instances when the Board's decision may be the last one subject to CEQA review that triggers an environmentally harmful action by other parties. An example is the overdrafting of ground water by farmers who do not

receive their irrigation supplies from State or federal water contractors.

Page 97: The document reinforces its early conclusion by observing that no evidence was presented that "...water mangers in any export areas would be forced to deprive the environment of needed water if exports remain on the average at current levels for the next five years" (emphasis added). Refuge water needs are critical in dry years, and waterfowl populations are more sensitive to specific dry year conditions than to an average delivery level over a five-year period.

Page 98, Paragraphs 2 and 3: The draft states that this Decision will not cause a significant effect in the estuary's watershed. We question this statement. The pulse flows would reduce reservoir storage in the San Joaquin Valley and in some of the Sacramento River tributaries. These requirements might also alter the amount and timing of hydropower releases throughout the watershed later in the year. Such changes could adversely effect both stream and reservoir fisheries and recreation, and therefore need to be evaluated.

Monitoring

Page 63, Paragraph 4: DWR and USBR are to revise the monitoring program and submit it for Board approval by November 1993. The Decision should recommend reimbursement to DWR and USBR for the costs of this revision from the monitoring fund.

Page 64, Paragraph 4 and Page 119, Item 10(f): DWR and USBR are to coordinate the development of real-time estimates of Delta consumptive uses through the Interagency Ecological Studies Program. This is not the type of activity that has traditionally been carried out under the program. The Decision should be revised to request only that DWR and USBR coordinate the required activity with designated agencies, with DWR and USBR to decide how best to do that through their programs. This activity should be reimbursable through the monitoring fund.

Page 117, Items 10(b) and (c): Although the intent of Item 10 (b,c) appears to exempt the projects from having to contribute up-front monies into the monitoring fund, we encourage the Board to assure that reimbursements will be made in a timely manner. If reimbursements are unduly delayed then the projects would have to provide further funding so the program could continue uninterrupted.

Page 64, and Page 118, Item 10(e): The Decision requires a baseline monitoring program to be presented for review at the

November, 1993 workshop which reflects real-time management of the Estuary. Existing operational and compliance multi-parameter recorder networks already provide real-time information that is centralized (California Data Exchange Center) and readily accessible by a variety of users including SWRCB staff. The revised monitoring plan being proposed by Interagency Ecological Studies Program participants will include provision for integrating and improving the efficiency of existing multi-agency networks, a moderate increase in real-time capabilities for existing recorder locations and a slight expansion of the network. These modifications should form an adequate baseline program.

Table II(c): The Department of Water Resources notified the Board in an October 2, 1992 memorandum that the location for the S-75 salinity compliance station as described in the December 5, 1985 revision to Decision 1485 is not suitable for data collection and reporting. An investigation to locate a suitable alternate is in progress. We should have a suggested location identified by the middle of June 1993. At that time we will petition the Board to revise the location. In addition, in Table II of Decision 1630 the location for S-75 is ambiguous because Pierce (Harbor) is north of the Morrow Island drainage ditch, not south.

Table IIIA, B, and C:

- D-1630 mandates significant additional new equipment installations. In the study area bounded by Vernalis on the San Joaquin River, Freeport on the Sacramento River and Martinez at the west

end of Suisun Bay there would be an immediate need for three new continuous recorder sites and one site to be activated by December 31, 1996. Additional parameter measurements would be necessary at four existing recorder sites. Anticipating an expansion of telemetry capabilities in the continuous recorder network for real-time management of the estuary, five existing recorders would have to be upgraded in addition to the four new locations for a total of nine. Modifications to three other locations would be necessary to comply with the additional requirements.

- A qualifier should be added to these tables (and in the order) which provides that if valid correlations can be shown between new location requirements and existing recorder sites, those relationships can be used to determine compliance.
- Baseline monitoring site MD 6 listed in Table III was discontinued with approval by the SWRCB in 1986.
- Table III designates four locations in the same vicinity of the San Joaquin River for collection of base parameters and continuous EC measurements; mouth of Fourteen Mile Slough, P8, Country Club Lodge at Lt. 43 and Rough & Ready Island. These sites are all in very close proximity and the monitoring requirements seem redundant. P8 represents the historic D-1485 discrete baseline station where base parameters are already being collected and Rough and Ready represents the historic

continuous recorder site. There is no need to collect this information again at the Fourteen Mile Slough and Lt. 43 sites.

- The S-36 site shown as a baseline station in Table III was inactivated due to access problems and maintenance demands that resulted in numerous data gaps. DWR has previously informed the Board that we are completing an EC/tide stage correlation analysis between this location and Hunter Cut (S-54), so conditions at S-36 can be determined from the S-54 record.
- The compliance location S-97 is established not proposed. Therefore the Table III description for S-97 should be revised to reflect that the station is established.
- All references to "electrical conductivity" should be replaced by the more appropriate term "specific conductance".
- Compliance with the 6.0 mg/L standard in the San Joaquin River between Stockton and Turner Cut would be virtually impossible (refer to our recommendations in the Water Quality Section). The daily D.O. ranges can be very extreme and individual values below 6.0 are routinely recorded (currently recorded every hour). This is assuming the SWRCB will accept the values being recorded at our Rough and Ready Island installation as being representative for that defined stretch of the San Joaquin River. This location does not reflect the deteriorating conditions upstream in the turning basin, and if this area is

included for compliance purposes, the standard will be perpetually out of compliance. The 1991 Water Quality Control Plan, as well as DWR testimony (WRINT DWR-46), detail numerous factors not related to State Water Project operations that contribute to D.O. problems in this area:

1. A dredged ship channel maintained and recently deepened by the Corps of Engineers.
2. Port of Stockton facilities including the enlarged turning basin which contributes heavily to the D.O. deficit.
3. Stockton Sewage Treatment Plant which still contributes high BOD loadings to the system.
4. Upstream BOD sources including nonpoint agricultural waste discharges, upstream STP's, and general enrichment of river waters.
5. Commercialized use of the dead-end portion of the Ship Channel which includes marinas, shipyards, vessel discharges, etc. The D.O. in this area commonly falls to zero when conditions are critical.

Page 121, Condition 16, b.(5) (Errata): Ongoing and future monitoring surveys concerning food chain relationships and fisheries impacts as they are affected by CVP and SWP operations

in the Delta and Suisun marsh should be recommended by the Interagency Ecological Study Program and not solely by the Department of Fish and Game. (It should be noted that DFG chairs the IESP.) Additionally, since the State Water Resources Control Board is a member of the IESP, their concurrence (or non-concurrence) should be a part of the decision-making process of the IESP, and not made separately.

Page 121, Condition 16, b.(6) (Errata): The time schedules called for under this condition are very unrealistic. Annual reports summarizing the previous calendar year's findings and detailing future study plans cannot be prepared in 15 days (due to the SWRCB by January 15 of each year). It is not even possible to complete the detailed reports by August 1 of each year. Field collection resulting in data entry, manipulation, interpretation and analysis requires at least six months.

A realistic time schedule would include the completion of a short (2-3 page) summary for each work element by April 1 of each year. the full detailed draft report could conceivable be completed by October 15, in time for the SWRCB's annual workshop in November.

Water Quality Objectives

Decision 1630 inappropriately places the responsibility for meeting all of the May 1991 Water Quality Control Plan objectives on the SWP and CVP. The hearing record, going back to 1987, is replete with evidence and testimony provided by the Department demonstrating that several of these objectives are influenced by factors beyond the control of project operations, such as local drainage and adverse tides. Following is a listing of the water quality objectives that the Board should either remove from the Decision or seek alternative means of implementation.

1. San Joaquin River at Stockton, Dissolved Oxygen

Evidence provided in WRINT DWR-46 demonstrated that under current conditions, even with the installation of the temporary rock barrier at the head of Old River, a DO of 6 mg/L cannot be maintained at all times in the San Joaquin River near Stockton. Many factors not related to SWP and CVP operations contribute to the DO problem, including: (1) the recently deepened ship channel, (2) the enlarged turning basin at the Port of Stockton, (3) the Stockton Sewage Treatment Plant, (4) upstream BOD sources, and (5) commercial use of the dead-end portion of the ship channel, where the DO often falls to zero. An implementation plan that considers all of these factors is needed in order to attain the objective.

2. Southern Delta Agricultural Objectives downstream of Vernalis (San Joaquin River at Brandt Bridge, Old River near Middle River, and Old River at Tracy Road Bridge)

The SWP responsibilities for mitigating impacts in the southern Delta are being addressed through successfully negotiated agreements as described in WRINT DWR-21, 22, 23, 24, 25, and 26.

These three southern Delta stations are degraded by local agricultural practices (drainage returns, concentration of salts, etc., see Phase I, DWR-246) such that salinity levels often rise above that of Vernalis (San Joaquin inflow station). As described in the above-referenced exhibits, the agreed-upon way to alleviate this problem is through construction of a series of barriers in conjunction with CVP/SWP pumping levels as experienced under D-1485. Even with installation of the barriers, there is no guarantee that the salinity levels specified in the Decision could be maintained. Furthermore, the additional pumping curtailment proposed under D-1630 would add to the difficulty of freshening this area with the higher quality Sacramento River water brought into the region by the pumps.

The Board should adopt the three-party South Delta Agreement as the implementation measures for water quality protection of South Delta agricultural uses for the State and Federal projects.

3. Contra Costa Canal at Pumping Plant #1, Chlorides

The Decision inappropriately requires the SWP and CVP to maintain year-round chloride standards at Pumping Plant #1, which intakes from the Western end of Rock Slough--a location that is not directly controllable by project operations. Once again, the record is replete with evidence showing the susceptibility of this station to factors such as local discharges (See phase I DWR -242, 243, 244 and Vol. VII, pp. 32, 55).

As against the State and federal projects, the Board should implement the M&I objective for the Contra Costa Canal service area by requiring that the projects meet 250 mg/L chlorides year round at an appropriate monitoring location in Old River (not within Rock Slough), such as Old River near Rancho Del Rio.

With respect to the 150 mg/L chloride objective, the Department reiterates its recommendation that this be removed. This standard is no longer appropriate now that the second and final contract has been successfully negotiated with Gaylord Containers (See WRINT DWR-57). This standard was established for the protection of two paper companies near Antioch. Meeting the 150 mg/L partial-year objective adversely impacts critical period water supplies. This is not a reasonable use

of water considering that the paper mills can treat their supplies to achieve desired salinity levels. And as previously noted, the Department has successfully negotiated compensatory agreements with both paper companies.

4. Cache Slough and Barker Slough, Chlorides

Similar to the Rock Slough problem, Cache Slough at City of Vallejo intake and Barker Slough at North Bay Aqueduct intake are at times susceptible to local discharges and runoff (see Phase I, DWR - 242,243 and 245). These stations, therefore, are not directly controllable through SWP/CVP operations.

The Board should establish a new control point in Cache Slough near Junction Point to be maintained by the SWP and CVP to properly allocate responsibility. Any degradation at the remaining stations would be caused by land-derived salts that should be controlled by controlling local and upstream discharges.

5. San Joaquin River at Prisoner's Point, Salinity

The Decision proposes a 0.44 EC objective at Prisoner's Point, which is several miles downstream of Vernalis on the San Joaquin River. Analysis of historical data indicates that with the Delta cross-Channel open, this standard would usually be attainable. However, D-1630 proposes that the cross-channel be

closed for an extended period (February-June), which would make compliance with this standard very difficult (if not impossible). The Decision should be modified such that the Prisoner's Point standard is relaxed whenever the Delta cross-channel is closed.

6. South Fork Mokelumne River at Terminous and San Joaquin River at San Andreas, Salinity

As with Prisoners Point, compliance with these standards historically has not been a problem when the Delta cross-channel is open. The effect of closing the cross-channel with respect to salinity at these stations has not yet been assessed; however, it would tend to degrade water quality.

We think that until ramifications of closing the cross-channel are determined through field experience, these standards should be relaxed whenever cross-channel closures are imposed.

7. Suisun Marsh Standards

The Department once again recommends that the Board adopt the Suisun Marsh Preservation Agreement, Monitoring Agreement and Mitigation Agreement and the standards contained therein as the implementation of Suisun Marsh area protection applicable to the SWP and CVP. Such action does not preclude interim or

longer term implementation of water quality objectives with respect to other parties.

8. Sacramento River at Freeport and San Joaquin River at Vernalis, Temperature

The temperature objective at these locations should be removed from the Decision because they cannot be controlled by water project operations, as correctly noted in footnote 4, page II-7.

9. Sacramento River at Emmaton, Salinity

A control point should be established at Threemile Slough as an alternative to Emmaton, to become effective when the Department has satisfied the conditions of our contract with the North Delta Water Agency.

Water Supply Impacts

The Department of Water Resources has completed several operation studies since the December 10, 1992 release of SWRCB draft Decision 1630 to assess the Decision's potential water supply impacts. Detailed results are reported in the February 2, 1992 DWR draft "Water Supply Impact Assessment of D-1630". Pages 82 through 89 of draft D-1630 contain statistics, graphs (Figures B, C, D, and E), and discussion based on an older operation study (designated as Study 7B). Although the total average annual impact numbers are similar in the updated study (Study 1630-3), there are a significant number of differences in the requirements of D-1630 and the requirements simulated in Study 7B. The Board should incorporate the Department's report, based on Study 1630-3, as a replacement for this section.

One Figure in particular, Figure D on page 86, is subject to misinterpretation. Figure D is an inappropriate comparison of historical Delta export amounts with simulated Delta exports for the period 1984-1991. This is misleading because under model simulations, project demands are held constant at the 1990 level (7.1 MAF/year) for every year of the study. This is done to determine the project's ability to meet current demands over a wide range (71 years) of hydrologic conditions. Historical Delta export data, on the other hand, is driven by year-to-year increasing demands, so the two are not directly comparable.

To illustrate this point, Figure 2 shows historical SWP entitlement requests and deliveries back to 1967. Note how deliveries grow over time as the population-driven demands (as well as increases in irrigated acreage) grow over time. During the "recent historical" period 1984-1991 selected for Figure D, California's population had grown by approximately five million, with accompanying increases in SWP demands. Also note the drought-induced reductions in deliveries which tend to obscure the upward demand trend, particularly during our recent drought.

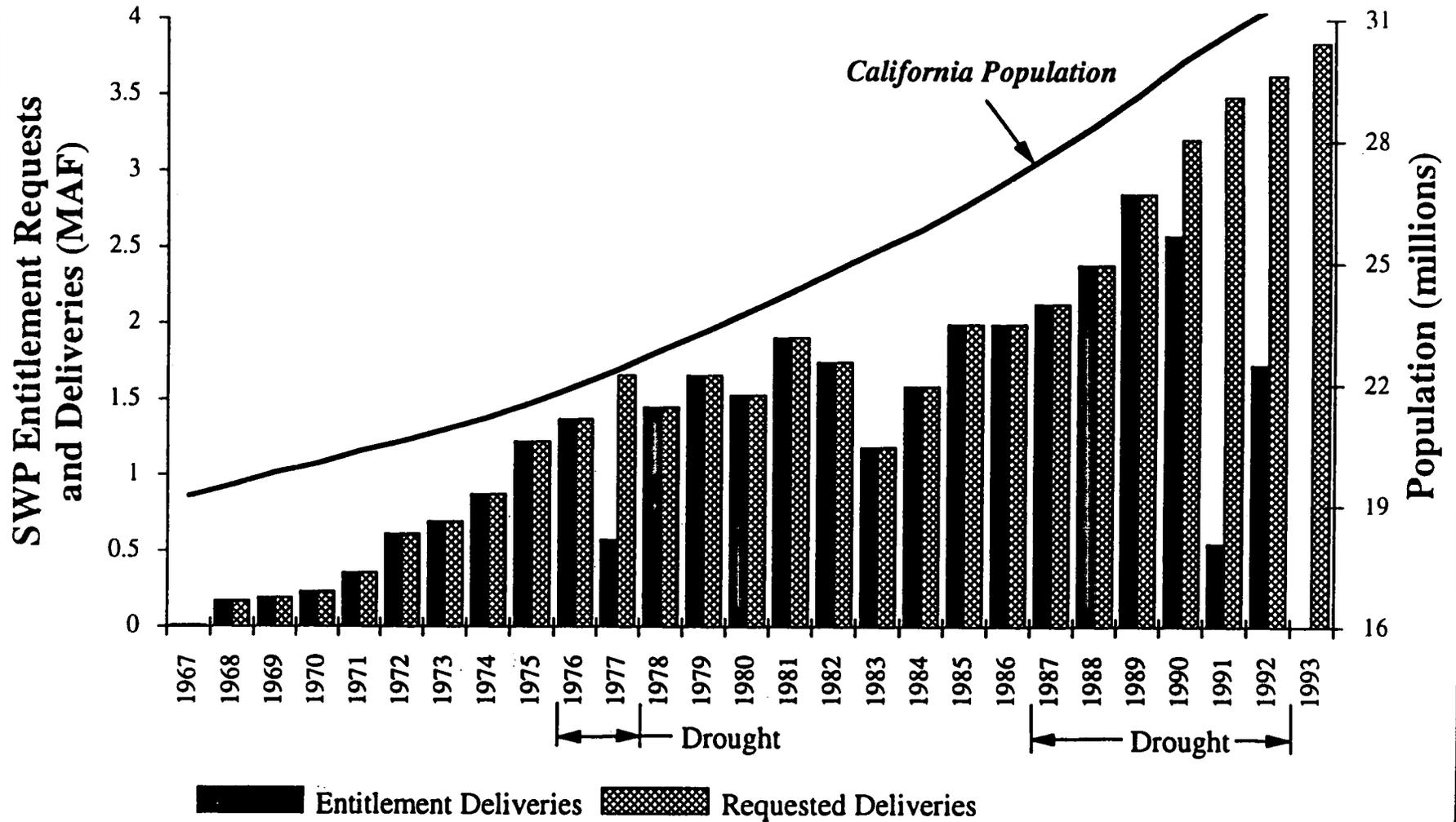
To imply that D-1630 would have minimal (100,000 TAF) water supply impacts based on a comparison with a selected historical (1984-1989) average is to ignore the demands of millions more people. A valid type of comparison with "recent historical" conditions is to recalculate project operations using actual storage levels and exports as a starting point. This type of analysis was done for 1991 and 1992, and the results are as follows:

<u>Year</u>	<u>Impact TAF</u>
1991	-1,177
1992	-1,037

Other significant differences between historical conditions and those simulated in a present level DWRSIM operations study are as follows:

Figure 2

SWP Entitlement Requests and Deliveries (1967-1993)



- Historical upstream depletions change over time and can be significantly different than those assumed in a current level study.
- Historical Trinity River imports do not reflect current operating policy for the Trinity River system.
- Historical operations of New Melones changing with time are quite different than those assumed for current level studies.
- Historical use of ground water may be different than that assumed for current studies.
- Historical water transfers (i.e., Yuba County Water) are not included in current studies.
- Year-to-year water storage carryover in major project reservoirs will vary from historical operations (due to different export demand levels and other factors).

In addition to the assessment of the impact of draft D-1630 on the ability of water projects to meet current out-of-stream needs (demands), including a current Delta export demand of 7.1 million acre-feet (MAF), a sensitivity analysis was made of the impacts during a critical dry period, assuming lower export demand levels of 6.3 MAF and 5.2 MAF. This analysis shows that the impact of draft D-1630 is very large, even at past demand levels and there is not a one-to-one correspondence of demand level with impacts:

<u>Level of Demand MAF/Yr</u>	<u>Total Critical Period Impact TAF/Yr</u>
7.1 (current)	-969
6.3	-901
5.2	-779

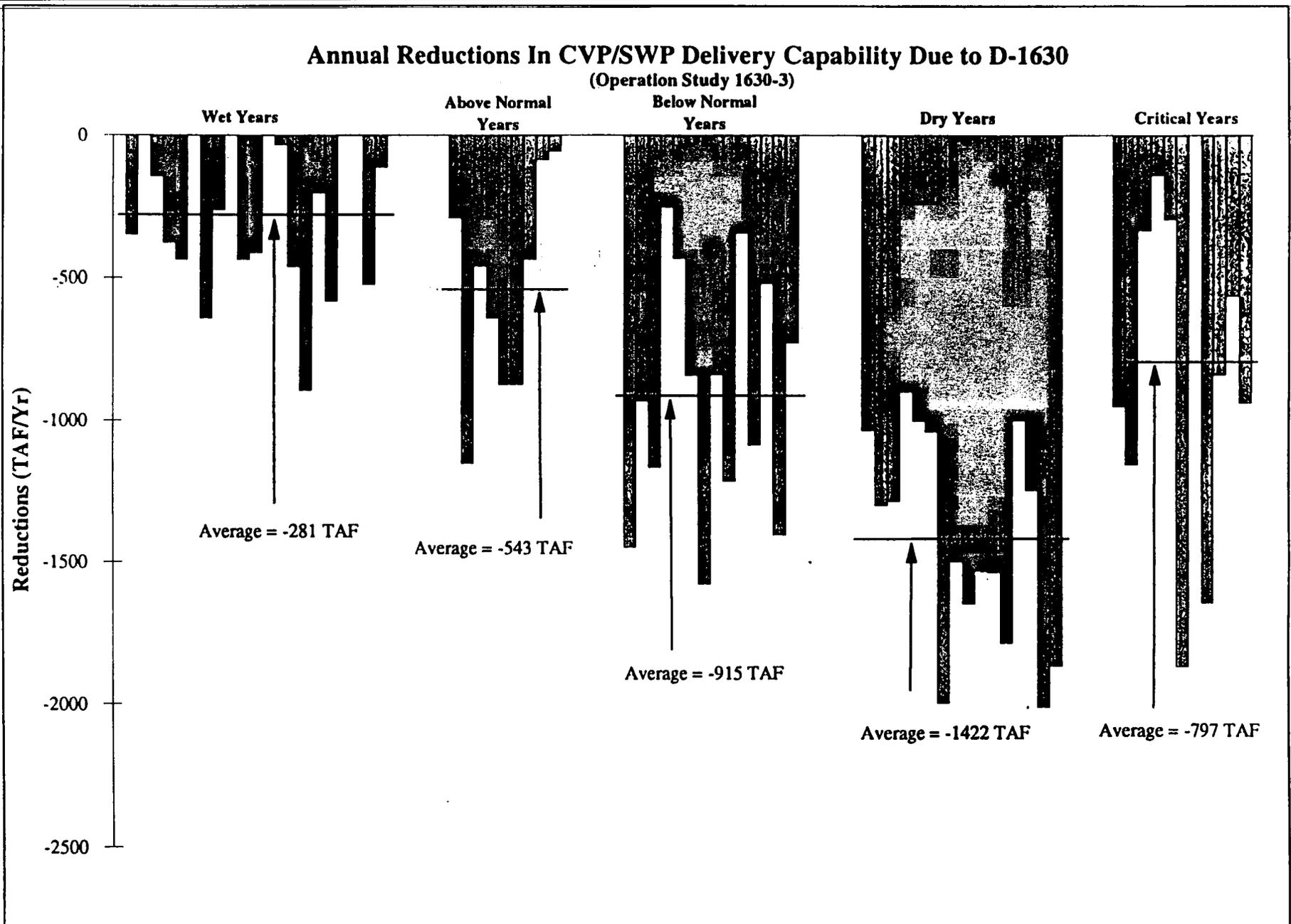
Operations Study Results

In all the operation studies, the impacts of draft D-1630 were compared against a base condition of D-1485, without consideration of pending changes in operation mandated under the State and Federal Endangered Species Act. There are no fixed winter-run limitations in effect. In fact, it appears that the current (and anticipated) NMFS criteria are a product of the draft decision. Impacts of reverse flow (QWEST) are very much in debate, especially as compared to cross-Delta flow via, e.g., Georgiana Slough. D-1630 has preempted this issue and taken away measures likely to be better for winter-run (Georgiana Slough closure) because they may increase reverse flow.

The standards proposed in draft D-1630 are more limiting to water project operation than the existing standards of D-1485. The most significant impact of draft D-1630 would be larger limitations on export pumping capability at the SWP Banks and CVP Tracy Pumping Plants. Following are average annual reductions in SWP/CVP combined delivery capability by year type, which are also shown graphically in Figure 3:

Delivery Capability Reduction, Wet Years	=	281 TAF
Delivery Capability Reduction, Above Normal Years	=	543 TAF

Figure 3



Delivery Capability Reduction, Below Normal Years = 915 TAF
 Delivery Capability Reduction, Dry Years = 1,422 TAF
 Delivery Capability Reduction, Critical Years = 797 TAF
 Maximum Single Year Delivery Capability Reduction = 2,015 TAF

The operation studies also calculate long-term (71 year) average annual impacts and historical critical period (1928-34) average annual impacts, as well as the relative proportion of impacts shared by the SWP, CVP and other projects. The relative split of water supply impacts between the projects is largely assumption-driven; therefore, the numbers should only be used in light of the assumptions.

<u>Water Supply Impacts TAF/Yr</u>	<u>Tuolumne and Merced Pulse Flows</u>			<u>Total</u>
	<u>SWP</u>	<u>CVP</u>		
o Average Long-Term (71 years)	-196	-589	-94	-879
o Historical Critical Period (1928-1934) Average	-366	-512	-91	-969

Specific Comments

Page 1, second paragraph: Statement that "this decision requires measures that will cause a shift in some export pumping from the late winter, spring and summer...to the late fall and early winter periods" is misleading. Figures 3A-3E in the Department's impact assessment report show that this Decision

would cause large export reductions most months and provide very little ability to recapture losses in the late fall and winter.

Page 15, fourth paragraph: The first sentence is not accurate. Figure 3 shows that this Decision would not allow larger water withdrawals in wetter years. On average, wet year delivery capability would be reduced by 251 TAF/year.

Page 88, Figure E: This figure is not accurate. Figures 5, 8, and 9A through 9E in the Department's impact assessment report present detailed graphics regarding Banks and Tracy Pumping Plant capacities.

Water Supply Impacts - Future Facilities/Water Transfers/
Sensitivity Analysis

1. SWP Future Facilities

DWR has been planning three major additions to the SWP system, namely, South Delta Facilities (SDF), Kern Ground Water Bank (KWB) and Los Banos Grandes Reservoir (LBG). Draft D-1630 would potentially impact all three of these future facility proposals. Although the D-1630 criteria are to be interim only, if physical solutions coming out of the BDOC process reasonably take 10-15 years to develop, obtain permits, and construct, then D-1630 or something similar could be in effect for much longer than its stated five years. In addition, fishery interests have made it clear that they expect long-term criteria to have restrictions with similar significant impacts on project operations and yield.

Under D-1485 the incremental increase in yield due to the South Delta Facilities (including the use of a greater Banks Pumping Plant capacity) is somewhat limited. This is because SWP San Luis storage is already frequently filled without the enlarged pumping plant capacity. However, under D-1630 SWP San Luis is full less often so that combined with the additions of the enlarged pumping capacity the incremental yield benefits of the South Delta facilities are somewhat higher than under D-1485.

KWB and LBG are offstream storage projects south of the Delta. KWB is a ground water reservoir and LBG is a surface water reservoir. They differ operationally in that the recharge and withdrawal rates for the KWB project are much slower than the LBG fill and release rates. However, the feasibility of both projects depends heavily on available export capacity at the Delta as well as surplus Delta flows.

Until a long-term Delta "fix" is achieved, the effectiveness of KWB and LBG will be significantly reduced under D-1630. The explanation for this is as follows. Under D-1485, the surplus water to make these projects feasible occurs when SWP San Luis storage would have filled and export capacity at the Delta Pumping Plant is still available. Both KWB and LBG can be utilized to move water south of SWP San Luis storage over time so that when surplus flows arrive in the Delta and export capacity is available, there will be storage capacity remaining in SWP San Luis to capture the surpluses.

Under D-1630 the SWP share of San Luis Reservoir will not fill as often, and when it does fill it will be full for a shorter time than under D-1485. Thus, the "window of opportunity" for new facilities, when Delta surplus flows occur and SWP San Luis would have filled, would be reduced under D-1630 both in frequency and duration. Also, exports are more constrained in February through May during periods when SWP San Luis would be

full. These factors, therefore, limit the effectiveness of building additional storage projects south of the Delta.

DWR has conducted several operations studies to analyze SDF, KGB, and LBG under D-1630. However, completion of these studies has been hampered by the complexity of programming D-1630 into the studies so that CVP operations are not effected by new SWP facilities. Therefore, while preliminary results are shown in the attached table, refinements to these studies could change yields and incremental effects significantly. Also, the studies were not performed at a full SWP entitlement request of 4.2 MAF/year which is normally the case when evaluating KWB and LBG.

Table 1 shows that in the long-term SDF incremental yields increase from 95 TAF/year under D-1485 to 101 TAF/year under D-1630. A 350 thousand acre-feet KWB program becomes less effective under D-1630; its long-term incremental yield drops from 63 TAF/year under D-1485 to 34 TAF/year under D-1630. The one million acre-feet KWB program when coupled with SDF loses incremental yield from 107 (202-95) TAF/year under D-1485 to 49 (150-101) TAF/year under D-1630. A 1.73 million acre-feet LBG when added to SDF and a 1 MAF KWB loses incremental yield from 146 (348-202) TAF/year under D-1485 to 68 (218-150) TAF/year under D-1630.

TABLE 1

COMPARISON OF INCREMENTAL YIELDS FOR
PROPOSED FUTURE SWP FACILITIES
UNDER D-1485 AND UNDER D-1630

<u>STUDY</u>	<u>D-1485 STUDIES^{1/}</u>		<u>D-1630 STUDIES^{2/}</u>	
	<u>70-YEAR AVERAGE (TAF/YEAR)</u>	<u>INCREASE ABOVE BASE STUDY (TAF/YEAR)</u>	<u>71-YEAR AVERAGE (TAF/YEAR)</u>	<u>INCREASE ABOVE BASE STUDY (TAF/YEAR)</u>
BASE	3132	-	2946	-
BASE + 350 TAF KERN GROUND WATER BANK	3195	63	2980	34
BASE + SOUTH DELTA FACILITIES	3227	95	3047	101
BASE + SOUTH DELTA FACILITIES + 1 MAF KERN GROUND WATER BANK	3334	202 (107)	3096	150 (49)
BASE + SOUTH DELTA FACILITIES + 1 MAF KERN GROUND WATER BANK + 1.73 MAF LOS BANOS GRANDES	3480	348 (146)	3164	218 (68)

1/ Based on an SWP demand of 3.8 MAF

2/ Based on an SWP demand of 3.6 MAF

2. Effects on Water Transfers

On page 3, fourth paragraph, the degree to which water transfers "are available to ensure adequate water supplies" is overstated.

North-south water transfers are dependent on available Delta export capacity at the Banks and Tracy Pumping Plants. The effect of D-1630 on the capability of potential water transfers

can be examined by analyzing the results from Study 1630-3 as shown in the DWR Draft "Water Supply Impact Assessment of D-1630" dated February 2, 1993. Figures 7G, 7H, and 7I show that QWEST would almost always limit Delta exports in July and August and most of the time in September. Note, when the QWEST limit is reached or controlling, further water transfers across the Delta would require a carriage water cost of 70 percent (i.e., for 100 TAF of water transferred, 30 TAF would be exported and 70 TAF would be Delta outflow). Figures 9A through 9E show that a portion of export capacity would be available during the September through January period. However, through operations study refinements and/or more coordinated operations of the CVP and SWP systems, the potential exists to utilize some of the remaining export capability from September through January for project storage withdrawals and exports. Thus, water transfer capabilities as indicated in Figures 9A through 9E may be overstated. To the extent that unused export capacities as shown in Study 1630-3 could be further utilized by the projects for storage transfers, water supply impacts as calculated in Study 1630-3 would be reduced.

Pages 15 and 16 (Urban Water Use Conclusion No. 2):
Additional emphasis is placed on water transfers among users south of the Delta. While this makes some sense, the potential for such transfers has not yet been explored. There is no "feedback loop" in the document for the Board to determine

whether this option can meet needs to the degree relied on. There is limited experience in agricultural-to-urban transfers south of the Delta. The emphasis on south-of-Delta transfers should take into account the potential sources of water being transferred. Realistically, such transfers are probably limited to those who have reliable local supplies (those with Delta supplies will have a higher degree of uncertainty).

3. Sensitivity Analysis of Draft D-1630

DWR ran several operations studies to examine the sensitivity of various elements of the draft D-1630 standards. The results of these studies are shown in Table 2, and should be considered preliminary. Time was too limited to thoroughly check results and/or refine the studies.

The first study is 1630-3 and shows the 1928-1934 dry period average annual impacts as well as the 71 year average annual water supply impacts over what would occur under D-1485.

Studies 2 through 6 show the impacts if a particular element is dropped from Study 1630-3. The elements are not additive. The numbers in parenthesis are the differences between the particular study and Study 1630-3.

For example, Study 2 shows that by dropping the Freeport pulse flow requirements (both the 13,000 cfs and the 18,000 cfs requirements) the water supply impacts are reduced from Study

1630-3 by 231 TAF/year during the critical dry period. Comparing with the 71 year average increment (23 TAF/year) suggests that these pulse flow requirements cause the largest water supply impacts in dry and critical years.

In Study 3, only the 13,000 cfs Freeport pulse flow requirement was dropped. By comparing with Study 2, it can be observed that the 18,000 cfs pulse requirement causes significantly higher impacts than the 13,000 pulse requirement, and both have higher impacts in dry and critical years.

In Study 4, the San Joaquin Pulse flow was dropped as well as the 1,500 cfs export limit (i.e., exports allowed to be either 4,000 cfs or 6,000 cfs depending on the year type). The water supply impacts of this export limit are almost the same regardless of year type.

In Study 5, QWEST was dropped in July through January. The results show this is less constraining in the dry and critical years (due to lack of supply) than in the 71 year average which includes normal and wetter years.

In Study 6, QWEST was dropped from February through June. Results show that water supply impacts of this decision element are almost the same for both the critical dry period average and the 71 year average (222 to 228 TAF/year).

Table 2
Sensitivity Analysis of D-1630
Water Supply Impacts (TAF/year)

<u>Study</u>	<u>1928-1934 Dry Period Average</u>	<u>1922-1992 71 Year Average</u>
1. Study 1630-3	-969	-879
2. Drop Freeport Pulse (13,000 cfs & 18,000 cfs)	-738 (231)	-856 (23)
3. Drop Freeport Pulse (13,000 cfs Only)	-887 (82)	-859 (20)
4. Drop San Joaquin Pulse and 1,500 cfs Export Limit	-803 (163)	-706 (173)
5. Drop QWEST July - January	-947 (22)	-686 (193)
6. Drop QWEST February - June	-747 (222)	-651 (228)

Real-Time Operations Issues

Page 46, first full paragraph, Table II, and Page 1 of Errata: The wording specifying the averaging of standards is ambiguous in both the draft Decision and the Errata. A sentence should be added to the last paragraph on page 1 of the Errata as follows: Therefore, for example, if a 14-day running average standard is specified from April 1 to April 30, compliance with the standard would not be measurable until April 14.

Table II, QWEST Standard: Some clarification is needed regarding the 14-day QWEST averaging during and after relaxation events due to Mallard Slough salinity (or outflow greater than 12,000 cfs). We recommend that following a relaxation period, the 14-day averaging be reinitiated after the Mallard salinity rises above 3.0 mmhos/cm (or outflow drops below 12,000 cfs). This same provision needs to be made following relaxation periods due to combined pumping rate of 2,000 cfs or less.

Pulse Flows, Terms 2, 3, 4, 5, 8(g), Pages 108-112: There is no assurance that releases from other than SWP and CVP reservoirs are in fact "new waters" to the system. For example, Page 55 -- "Upstream reservoirs shall be credited with any releases for public trust uses being made during pulse flow periods." If this is the normal mode of operation, these releases are not new sources of water to the system.

Other problems with the pulse flow conditions are as follows:

1. Pulse Flow Payback Period - The Decision states that the projects that are to participate in the Pulse Flows could have as long as 240 days (8 months) to pay their share of the flow, which is far too long. Payback delays also entail a loss in power revenue and increased problems in meeting downstream temperature requirements due to lower reservoir elevations through the summer months.

2. Accounting Procedures - From a practical standpoint, the requirements may not be workable. The repayment period of eight months would necessitate a complex accounting system and considerable personnel to determine "new water" that could be credited against advances made by the SWP and CVP. Requiring the Projects (SWP and CVP) to advance the releases means that in all probability they will never get repaid. To help prevent this, pulse flow requirements for all affected water right holders must be enforced simultaneously. It would be almost impossible to determine whether the payback flows at a later date were being released over and above the normally scheduled releases because there is so much flexibility in operations due to hydrologic differences between months and years. Releases of the water for affected reservoirs on a real-time basis would also help mitigate the power head losses of the CVP and SWP reservoirs.

3. Averaging - Table II specifies minimum daily flows for the pulses, and this would require significant additional releases to maintain an operational buffer. Such releases would entail additional impacts not accounted for in model studies.

A more appropriate order by the Board to help ensure that all designated water right holders would contribute toward their respective share would include the following:

1. All pulse flows are to be maintained on a 14-day running average basis, as described in item 3 of the December 23, 1992 memo from Edward Anton to Edward Huntley (see Appendix 2 of DWR report "Draft Water Supply Impact Assessment of D-1630").
2. Pulse flow requirements only take effect when the Executive Director declares a starting date for a pulse, with a minimum one-week advance notice, and the measured (or forecast) flow at Freeport (or Vernalis) is less than the specified pulse flow rate.
3. After satisfying the previous condition, the Executive Director would then order all affected reservoir operators to release their proportionate share of the incremental pulse release requirement, as per the percentages specified in Tables IV and V, within 48 hours. The additional release rate is to be continued throughout the pulse flow period and modified either

up or down to maintain the required pulse flow 14-day average rate as ordered by the Executive Director..

For example, say the Sacramento River at Freeport (at starting pulse date) is at 14,000 cfs and the target pulse objective is 18,000 cfs. The incremental pulse release requirement to meet the pulse flow is 4,000 cfs. PGandE's allocated share (American 0.13% + Feather 6.01% + Yuba 1.31% = 7.45%) of the release is:

PGandE's Share of Pulse Flow = 4,000 cfs x 7.45% = 298 cfs^{1/}

4. The incremental pulse release requirement, for calculation of sharing, is the difference between the target pulse objective and the measured (or forecast) flow at Freeport (or Vernalis) at the scheduled start of the pulse period.
5. In addition to the requirements for real-time releases, the Decision should include measures for subsequent refill accounting to ensure that upstream reservoir operators do not simply reduce releases later in the year and negate equitable sharing.

^{1/} This is an example only. We understand that PGandE's status in these proceedings may change.

Supply/Demand/Conservation

Page 2, Item 9; Page 65, Water Supply Reliability; Page 67, Paragraph 4; and Page 115, Condition 8: The statement that low carryover storage decreases water supply reliability and implications that higher carryover storage would increase reliability are misleading. In a given year, if you don't deliver water in order to hold carryover storage higher, you have reduced deliveries that year; furthermore, higher carryover storage increases the chance of spill in the following year thereby further reducing delivery capability. Consequently, the delivered supply may be more reliable, but smaller. Decisions concerning reservoir operations, delivery forecasts, and carryover storage targets should remain within the purview of DWR and USBR.

Page 9, Paragraph 1: Increased growth in hotter, inland areas should be included with the other reasons for increased exports for urban uses in the future.

Page 10, Paragraph 1: The last sentence should be modified to read, "These conservation efforts will partially offset increases in demand caused by population growth and the increased growth rates in hotter, inland areas". DWR now estimates that urban demand will increase by 3,000,000 acre-feet by 2020.

Page 10, Paragraph 4 and Tables A (pg 11) and B (pg 12): This is an invalid comparison of data between Table A (drought

contingency based) and Table B (based on MWD's long-term management plan).

Pages 16, 17, and Pages 112-114, Condition 6: We agree that the diversion and use of water for urban uses should be subject to the provisions of the September 1991 Memorandum of Understanding; however, this mandate should not remove the exemption process. Exemptions were agreed upon in a consensus process and are based on cost/benefit analysis. Overturning this element of the BMP consensus agreement could cause an undue burden on many water agencies. In addition, significant real system savings may not result from these actions and the criterion of cost-effectiveness, an important part of the BMP process, may be violated.

DWR, through its Statewide Planning efforts, determines current and projects future water supply requirements for all regions of the State and reports its findings in California Water Plan updates. DWR includes the effects of conservation through the implementation of Best Management Practices, among other measures, in calculation of urban water demands.

The signatories to the MOU are required to develop savings estimates. All such estimates should be forwarded to DWR for use in its Statewide Planning efforts.

Page 16, Paragraph 2a: State and federal legislation enacted during 1992 already provides for water conserving plumbing fixture standards.

Page 17, second Paragraph: How can "tiered water pricing" be implemented in areas with no water meters?

Page 17, last Paragraph: As established in the MOU, the California Urban Water Conservation Council should be the entity responsible for monitoring progress of implementation, not DWR.

In the event that DWR is to perform this function, D-1630 should require water suppliers to report BMP progress and disaggregated water use data directly to DWR, in a format prescribed by DWR, so that DWR has the information from which to make its annual report to the Board and for use in our California Water Plan updates. Also, a portion of the proposed D-1630 mitigation or monitoring fund should be appropriated to DWR's Urban Water Use Program to perform this effort.

Page 18, Paragraph 3: The record should include DWR's exhibit on agricultural water conservation submitted in the 1987 Phase I Hearings: "Irrigation Water Use in the Central Valley of California", July 1987, University of California and DWR. This report was equally as rigorous as the SJVDP report. It concluded that approximately 150,000 acre-feet of on-farm reduction in deep percolation were attainable.

Secondly, DWR has estimated that 154 TAF by 2000 and 299 TAF by 2020 could be available by the implementation of the recommended actions in the SJVDP report. However, these estimates were based on adding the drainage reduction due to source control and land retirement. The reuse of drainage water by eucalyptus and halophytes is still considered experimental. The Westlands Water District Plan noted on page 19 does not include the growing of eucalyptus and halophytes for drainage reduction.

Page 20, first paragraph: This paragraph compares San Joaquin Valley to Westlands for water use vs. crop yields. This is misleading because it grossly over-simplifies the difference between Westlands and other areas of the Valley. For example, 60 percent of the Valley does not grow cotton and processing tomatoes. Secondly, soil type and ground water recharge capability have a large impact on the average water use for the San Joaquin Valley. Furthermore, the citations from the Westlands Water District's Water Conservation Plan omitted an important footnote to the table. The source of the applied water numbers was WRINT-DWR-11, which indicated very little agricultural water conservation potential remaining in the Valley at a 73 percent seasonal application efficiency.

Page 21, Paragraph 2: 80-85 percent irrigation efficiency for microirrigation systems may be near optimal for San Diego; however, it does not reflect appropriate irrigation methods or

efficiencies for portions of the Sacramento and San Joaquin Valleys. Again, soil type, slope, ground water recharge, and other factors make this a much more complicated concept. Secondly, what is the definition of irrigation efficiency used in this Decision? DWR has adopted the findings of Bay/Delta Agricultural subwork group #1 (WRINT-DWR-11) for a target seasonal application efficiency for the Central Valley in the California Water Plan. That target equaled 73 percent (SAE) accounting for effective precipitation, a five percent leaching requirement and an 80 percent distribution uniformity. This SAE was agreed upon by most experts and should be the basis of the findings.

Page 22, Paragraph 1: This paragraph overstates the success of tiered water pricing schemes in the San Joaquin Valley. Sandra Archibald of the Center for Economic Policy Research testified that the Central California Irrigation District abandoned their tiered pricing program because it exacerbated problems with regard to projecting revenues for financing district operations.

Page 26, Paragraph 1, Requirement and Page 115, Condition 7: There are a number of inconsistencies with the San Joaquin Valley Drainage Program as well as other studies as follows:

1. The applied water values, cited for Westlands in comparison with the rest of the San Joaquin Valley, were based on applied

water values from WRINT-DWR-11. These values need to be shown for all major crops, not just for cotton and tomatoes.

2. The finding of Westlands efficiency when compared with the rest of the Valley is not supportable when compared with the SJVDP report. That report found the highest efficiencies existed in the Tulare subarea, not the Westlands subarea.
3. The irrigation efficiencies cited for San Diego County cannot be applied to the San Joaquin Valley. The average target SAE of 73 percent cited in WRINT-DWR-11 is supported by experts and is more appropriate. This provides 27 percent deep percolation to deal with both salt leaching and unavoidable irrigation system nonuniformity.
4. A large portion of the drainage volume would have to be reused by salt tolerant trees and halophytes. This assumption is premature. Relying solely on the SJVDP report may be supportable in the long-term to 2040 but not realistic in the short-term.
5. Both the report, "Irrigation Water Use in the Central Valley of California" and WRINT-DWR-11 contained minority reports challenging the quantity and quality of applied water data. These challenges are valid in some areas of the San Joaquin Valley. However, the SJVDP report is subject to the same criticism regarding data because it was based on essentially

the same applied water data. To assume that the data exists or could be collected by March 1994 to estimate deep percolation reductions is unrealistic.

6. Using data describing crop production in Westlands Water District from the table in Draft D-1630, page 20, the amount of deep percolation needed to overcome irrigation system nonuniformity and to leach salt in that area is between 0.6 af/a per year for tomatoes and 0.7 af/a per year for cotton.

7. The San Joaquin Valley Drainage Program estimated average deep percolation to vary from about 0.9 to 1.05 feet. This finding is from 83 field studies in the drainage problem areas of the San Joaquin Valley (Burt and Katen, 1988). That means that on average deep percolation can be reduced by about 0.3 to 0.4 af/a per year. It is, however, important to keep in mind that this is an average and that a uniform reduction requirement would be inappropriate as many of the fields are already at less than 0.9 af/a per year deep percolation.

Page 58, last paragraph: The impact of the assessment of fees on water users has not been evaluated by the Board. While, in many cases, the effects for urban users will be small, it is very likely that agricultural users will be heavily affected. In extreme cases, some farmers will be unable to continue farming due to their already marginal financial status. Some land, now economically productive, will cease to be used for farming. In

other cases, farmers now using surface supplies will either be forced to substitute cheaper ground water or will find that source more economically attractive. This can have serious consequences for ground water quality and subsidence in areas vulnerable to these problems. (Preliminary DWR economic impact studies show about a 10,000 acre drop in irrigated farmland and an increase in ground water pumping for agriculture of about 1 MAF associated with a \$5 per acre foot fee for applied water in the Central Valley.) A major effect of the assessment of fees will be a decline in the value of agricultural land for crop production. This occurs because land value for crop production is based on the capitalized expected net income stream. Higher water costs reduce this income stream. This land value drop has many implications. Farmers presently unwilling to sell their land for urban development will find this option more attractive. Production credit, the lifeblood of farming, will be harder to obtain because of the lower asset value of farmland. Rural communities, which depend upon ad valorem taxes, will suffer from reduced revenues due the drop in farmland value.

Page 61, Monitoring Fund: Same general comment as page 58 above.

Page 69, IV Long Term Goals: This section should reference the California Water Plan as the State's water supply planning document.

Page 93, Paragraph 2: The actions mandated by the Board in D-1630 would have substantial impacts on the sources of supply and the timing and types of water use in both the upstream and export areas. The probability is high that there would be substantial associated environmental impacts.

Page 114, Item b: Water districts formed under statutes which restrict the generation of excess revenues may have difficulty establishing generally higher rates during dry and critically dry years.